

INTERPLANETARY SHOCK TRIGGERING OF PLANETARY AURORAS

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Significant charged particle precipitation occurs in the dayside auroral zone during and after interplanetary shock impingements on the Earth's magnetosphere. This dayside precipitation represents direct solar wind energy input into the magnetosphere/ionosphere system. Different mechanisms are operable during different phases of the event. Immediately after shock compression of the magnetosphere, precipitation related mechanisms are: 1) betatron compression of preexisting outer zone magnetospheric particles. The anisotropic plasma is unstable to the loss cone instability leading to electromagnetic plasma wave growth, resonant particle pitch angle scattering and particle losses into the upper ionosphere. 2) The compression of the magnetosphere can also lead to enhanced field-aligned currents and the formation of dayside double-layers. Finally, 3) in the latter stages of the event, a viscous-like interaction occurs in the flanks of the magnetopause. Similar auroras caused by shocks/high speed streams should occur at Jupiter and Saturn. The shock-aurora should also define the last closed magnetic field lines.

Submitted to PS5.01 (Magnetospheres and ionospheres and their interaction with the solar wind)

Convener: R. Prange